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Outcome Measures of Functioning and Physical Activity in Patients with Low Back Pain

Exemplified in Patients Who Undergo Lumbar Fusion Surgery

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademin, Göteborgs universitet kommer att offentligen försvaras i R-aulan, Sahlgrenska universitetssjukhuset, Mölndal, fredagen den 1 februari, 2019, kl. 09.00

av

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Avhandlingen baseras på följande delarbeten

I. Jakobsson, M., Gutke, A., Mokkink, L., Smeets, R., Lundberg M. (2018). Level of Evidence for Reliability, Validity, and Responsiveness of Physical Capacity Tasks Designed to Assess Functioning in Patients with Low Back Pain: A Systematic Review Using the COSMIN Standards. *Physical Therapy Journal.* doi:10.1093/ptj/pzy159

II. Jakobsson, M., Brisby, H., Gutke, A., Lundberg M., Smeets, R. One-Minute Stair Climbing, 50-Foot Walk, and Timed Up-and-Go Were Responsive Measures for Patients with Chronic Low Back Pain Undergoing Lumbar Fusion Surgery. Submitted.

III. Lotzke, H., Jakobsson, M., Gutke, A., Hagströmer, M., Brisby, H., Hägg, O., Smeets, R., Lundberg, M. (2018). Patients with Severe Low Back Pain Exhibit a Low Level of Physical Activity Before Lumbar Fusion Surgery: A Cross-Sectional Study. *BMC Musculoskeletal Disorders*, 19(1):365. doi:10.1186/s12891-018-2274-5

IV. Jakobsson, M., Brisby, H., Gutke, A., Hagg, O., Lotzke, H., Smeets, R., Lundberg, M. (2018). Prediction of Objectively Measured Physical Activity and Self-Reported Disability Following Lumbar Fusion Surgery. *World Neurosurgery*, 121:e77-e88. doi:10.1016/j.wneu.2018.08.229

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Outcome Measures of Functioning and Physical Activity in Patients with Low Back Pain

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ABSTRACT

Introduction: Chronic low back pain (LBP) can negatively affect health in terms of disability and decreased levels of functioning and physical activity. Chronic LBP due to degenerative disc disease (DDD) is a subgroup of LBP for which lumbar fusion surgery (LFS) is a treatment option. LFS is usually evaluated with patient-reported outcome measures (PROMs) of disability, but physical capacity tasks measuring functioning and accelerometers measuring physical activity can complement the use of PROMs to better understand patients' health.

Aim: To investigate aspects of the measurement of functioning and physical activity in patients with LBP.

Methods: In Study I, articles on physical capacity tasks for patients with LBP were systematically identified and the level of evidence for the reliability, validity, and responsiveness of the tasks was determined. Studies II–IV included patients with chronic LBP due to DDD scheduled for LFS. In Study II, the responsiveness and minimal important change of four physical capacity tasks were investigated with hypothesis testing and the optimal cutoff point method. In Study III, patients' preoperative level of physical activity was studied with accelerometers. Associations with potential barriers to physical activity were investigated with regression analysis. In Study IV, preoperative predictors of the patients' levels of physical activity and disability six months after surgery were investigated with regression analysis.

Results: Five-repetition sit-to-stand, five-minute walk, 50-foot walk, progressive isoinertial lifting evaluation, and timed up-and-go demonstrated the best evidence for reliability and validity for patients with chronic LBP (Study I). Of these, five-repetition sit-to-stand also showed adequate responsiveness. One-minute stair climbing demonstrated adequate results for both reliability and responsiveness. In Studies II–IV, 118 patients with chronic LBP due to DDD were included. Fifty-foot walk, timed up-and-go, and one-minute stair climbing demonstrated adequate responsiveness while 5-minute walk did not (Study II). Ninety-eight patients did not fulfill the WHO recommendations on physical activity, of whom 32 did not accumulate a single minute of the required 150 minutes per week of physical activity. Moreover, high levels of fear of movement and disability were associated with a low preoperative level of physical activity (Study III). A low preoperative level of physical activity and a high preoperative level of self-efficacy for exercise were predictors of a larger increase in the postoperative physical activity. A high preoperative level of disability and low preoperative levels of pain catastrophizing and self-efficacy for exercise were predictors of a more favorable outcome for disability (Study IV).

Conclusions: Fifty-foot walk and timed up-and-go showed adequate results for reliability, validity, and responsiveness and are recommended for assessment of functioning in patients with chronic LBP due to DDD undergoing LFS. Future pre- and postoperative interventions targeting fear of movement and disability might increase the level of physical activity in physically-inactive patients. The prediction model of physical activity could possibly be used in clinical practice to predict which patients are in need of extra pre- and postoperative interventions to increase their level of physical activity.

Keywords: Health outcome assessment, reliability, validity, responsiveness, minimal important change, accelerometry, predictors, prognostic factors, lumbar spine surgery

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